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**HANDBOOK OF INSTRUCTIONS
WITH
PARTS CATALOG**

AIR CORPS TYPE P-1 GENERATOR

(FOR AIRCRAFT)

MODEL 2CM70B1

GENERAL  ELECTRIC
SCHENECTADY, N. Y.
U.S.A.

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October, 1942 (4700)

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SECTION I
INTRODUCTION

1. The Type P-1, main-engine-driven d-c generator is for use on aircraft for supplying electric energy for 24-volt systems.
2. This handbook covers the installation, inspection and maintenance of the subject equipment.
3. This handbook is issued as the basic Technical Order for the equipment involved.

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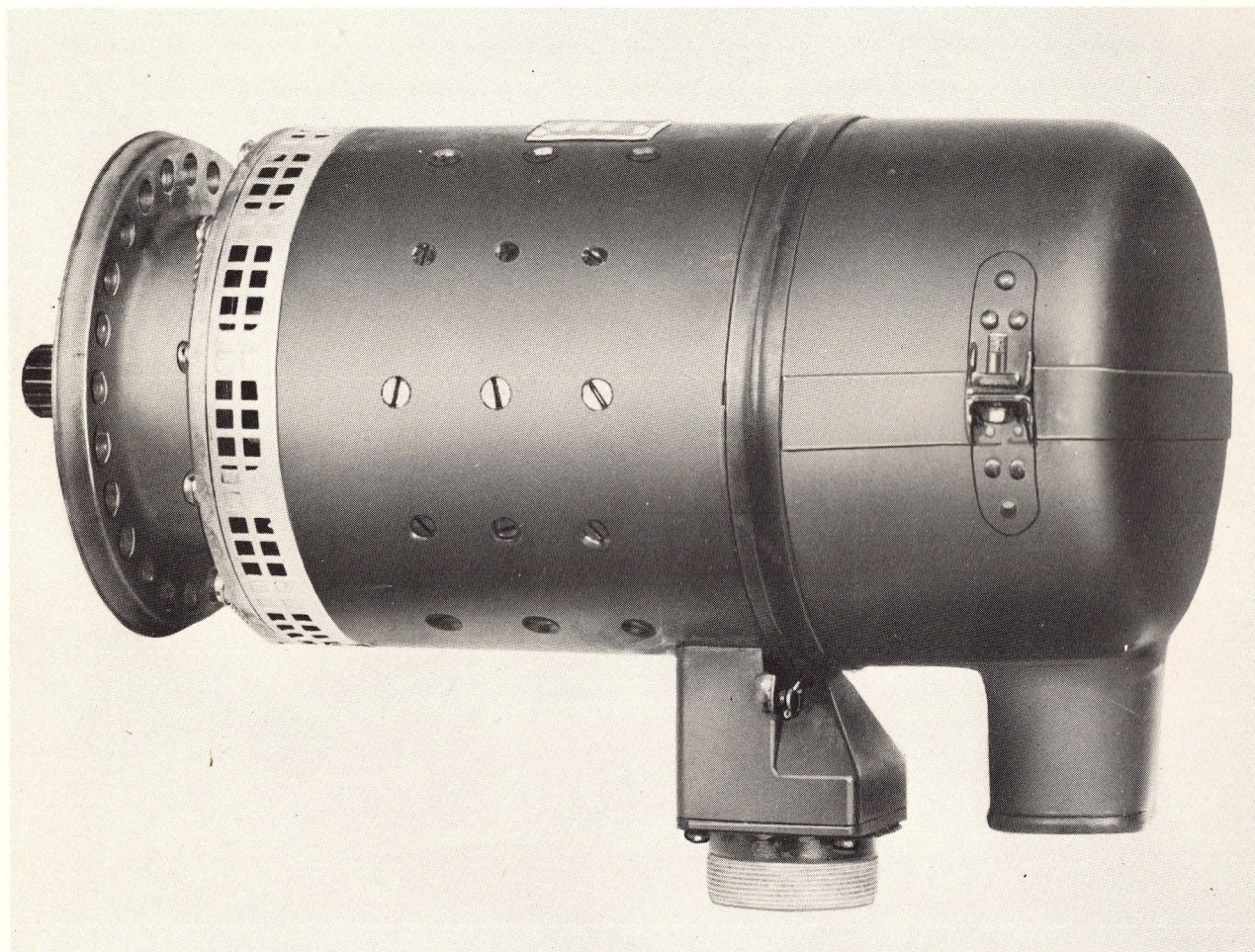


Fig. 1. Generator, Model 2CM70B1

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SECTION II

GENERAL DESCRIPTION

1. The Type P-1 (G-E Model 2CM70B1, round frames) engine-driven d-c generator described in this handbook is equipped for forced ventilation.

a. The Model 2CM70B1 generator has the following rating: 2500/4500 rpm, 5.7 kw, 28.5 volts, 200 amperes noninjurious heating 20 C ambient temperature, air supplied at ten-inch water pressure through a two-inch outside diameter aluminum tubing.

2. The generator as shown in Fig. 1 is a six-pole, fully enclosed, compensated, commutating-pole design.

3. Over-all and mounting dimensions are shown in Fig. 2. Mounting dimensions are in accordance with Fig. 1 of Army Specification No. 95-27276.

4. The generator is mounted on the aircraft engine and is held rigidly in place by means of six studs and nuts. Twenty-four 25/64-inch diameter holes, equally spaced, are provided in the mounting flange to permit 15-degree increments of rotation. The generator is driven by the engine through a gear on the end of the generator shaft.

5. Electric connections are made to the generator through the AN3102-32-1P connector receptacle mounted on the generator.

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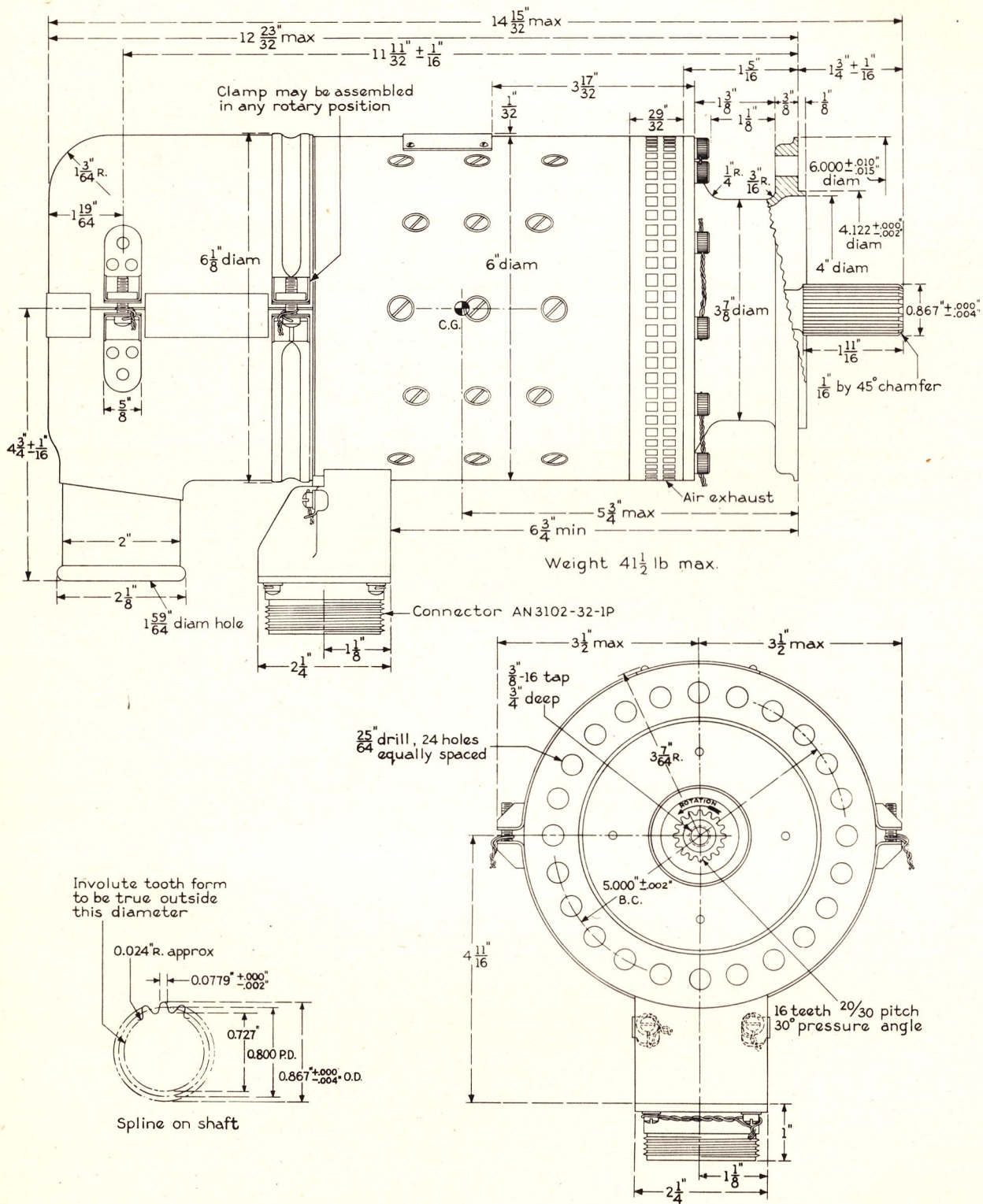


Fig. 2. Dimensions of Generator

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SECTION III

DETAILED DESCRIPTION

1. INTRODUCTION

a. The Model 2CM70B1 generator consists of the following main subassemblies (see Fig. 3): Field assembly (74), armature assembly (2), brush-rigging assembly (41), mounting flange (70), commutator-end shield (40), and air-blast cover (139).

2. FIELD ASSEMBLY (See Fig. 6)

a. The field (74) consists mainly of a field frame and field windings. The field windings include a shunt-wound main winding (87), a compensating winding (88), and a commutating winding (89). The field also includes the leads (120 and 125) and the connector (119).

3. ARMATURE ASSEMBLY (See Fig. 7)

a. The armature (2) consists of the following parts: An armature core (3), a commutator (10), armature winding (19) with necessary insulation, binding wire (21) and an outer shaft (4). The armature core is composed of a stack of punchings (6), built up on an outer shaft (4) and held tightly in place by a shrink collar (8). The inner shaft (22) is slender and is separated from the outer shaft by an asbestos wrapping (24). This type of shaft construction is especially adapted for transmitting the pulsating torque of the aircraft engine to the rotor of the generator.

4. BRUSH-RIGGING ASSEMBLY (See Fig. 8)

a. The brush-rigging assembly (41) is made up of a brush-holder yoke (67), six brush-holder assemblies (60), cross connectors (49 and 53) and necessary insulating washers (45), bushings (47) and shear nuts (46). The brush-holder assembly (60) is a stainless steel fabricated assembly (61), brush springs (65) and cotter pins (66). The retaining strip (63) of the brush-holder-body assembly requires no barrier or spacer between brushes and thus permits ready removal of the brushes without disassembly of the generator. Brush-spring pressure is factory-set at 1 to 1 1/2 pounds. Brushes are specially treated to withstand operation at high altitudes.

5. CONNECTIONS (See Fig. 5)

a. The connections of the generator are shown in the winding and connection diagram, Fig. 5. Connections to the brushes are made by means of three leads from the field. All other internal connections are a part of the field. External connections are made to the connector receptacle, AN3102-32-1P.

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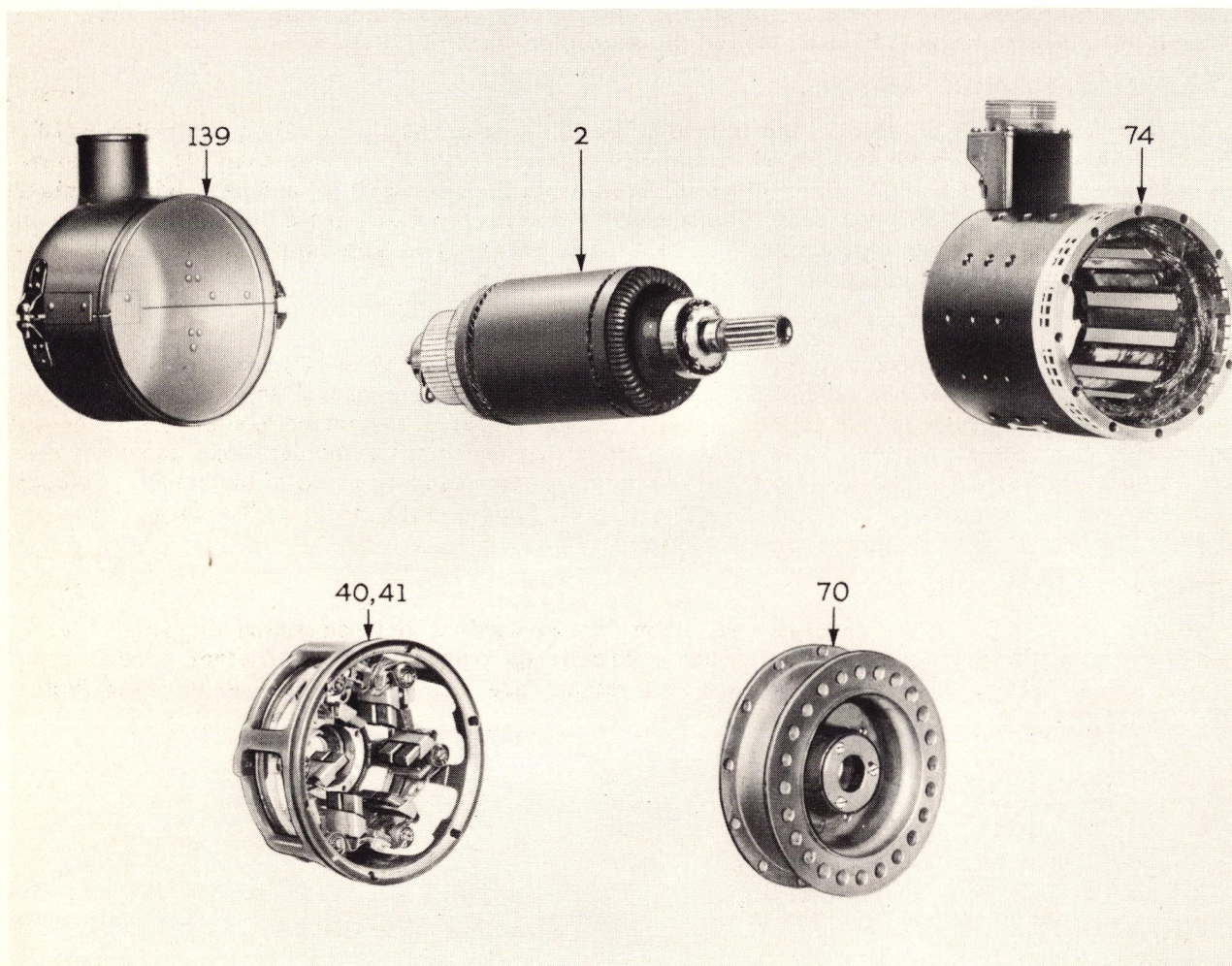


Fig. 3. Principal Subassemblies of Generator

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SECTION IV INSTALLATION AND OPERATION

1. Each generator is packed for shipment in accordance with the current issue of the consolidated freight classification. When received, the generator should be examined for any damage incurred during shipment. Do not pick up or carry by holding shaft extension of the generator.
2. The shaft extension of the generator is coated with a protective layer of grease when shipped. This should be removed with gasoline (or a good noninflammable agent preferred) before the generator is put in service.
3. Rotate the armature by hand to make certain it rotates freely. The drag on the armature is due to brush-spring tension, but it should be possible to turn the armature by hand.
4. Inspect air-blast cover (139) for dents. If there are any dents, remove the cover and lightly tap out the dents. Replace cover and safety wire the clamping screws.
5. Twenty-four holes have been provided in the generator mounting flange (70). These holes permit rotation of the generator by increments of 15 degrees until the best mounting position is found for the engine with which the generator is used.
6. Air-blast cover (139) may be loosened and rotated through a circle thus permitting the air inlet (152) to be placed in any position best adapted for connection to air supply. Cover must be tightened and rewired after adjustments.
7. Connections to the generator are made by a standard connector plug AN9534-32-1S, which mates with the connector receptacle AN3102-32-1P on the generator.
8. After the generator is installed and properly connected, little attention is required for its operation. The load on each generator should not exceed the ratings given in Section II, if long generator life is to be expected.

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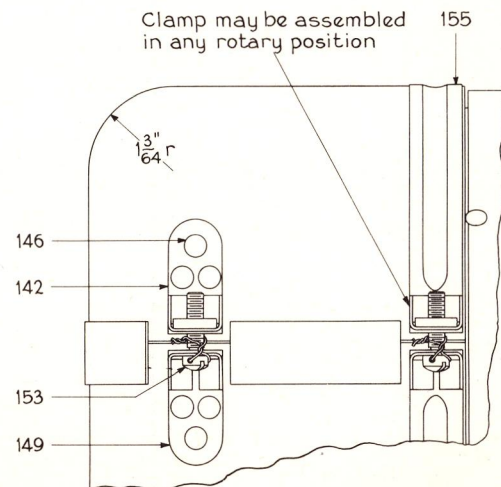
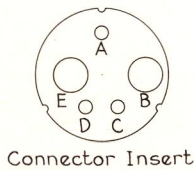
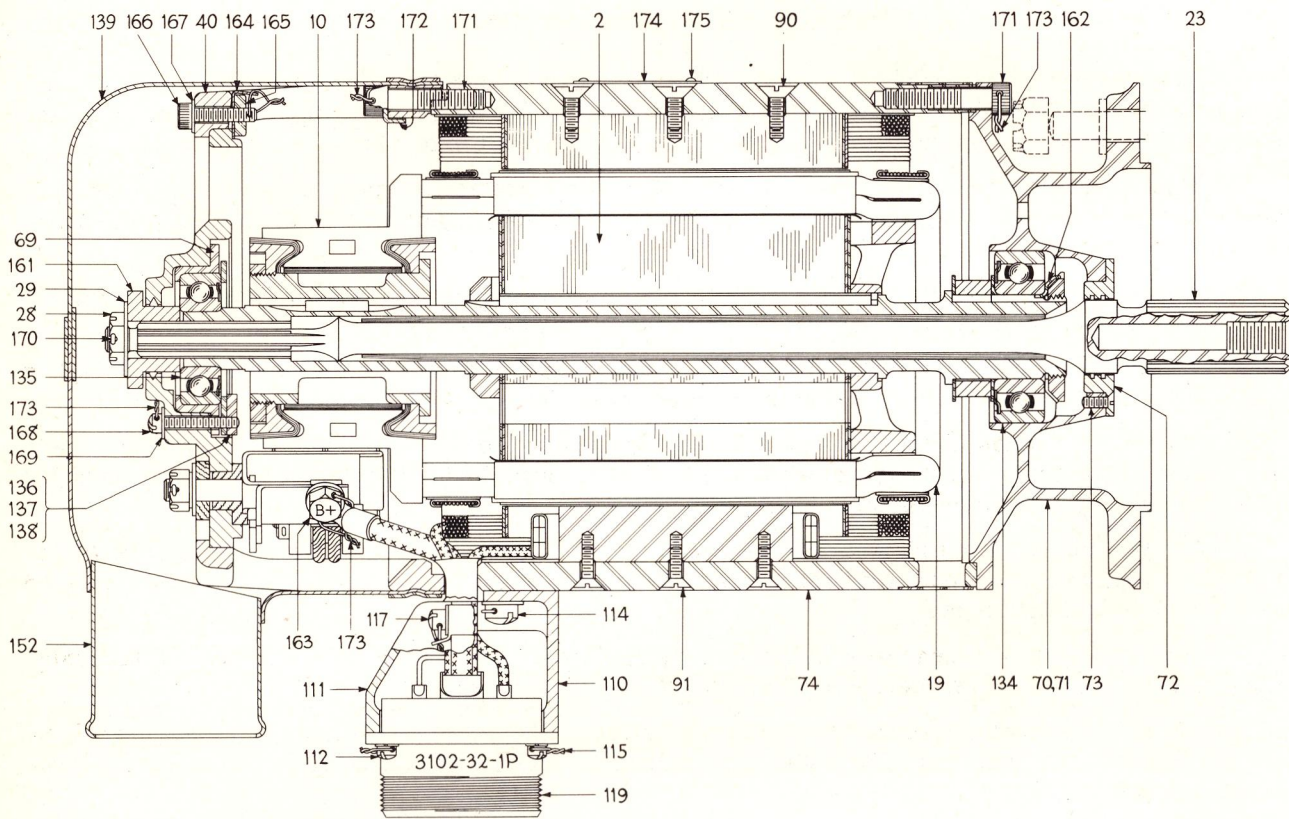


Fig. 4. Ref. 1 Assembly of Generator

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SECTION V

INSPECTION, MAINTENANCE AND LUBRICATION

1. After initial installation on the aircraft engine, the generator should receive careful surface inspection at ten-hour intervals for the first fifty hours of operation. After that period it should receive a surface inspection at every general engine inspection and wash down. Surface inspection is made to detect possible defects in the mounting flange or other castings.

2. At every general engine inspection examine the brushes of the generator to see that they move freely in their holders. Replace brushes if the wearing length (distance from face of brush to rivet) is less than 1/8 inch. At the same time inspect connections at the brush terminals to see that they are tight. Inspect the commutator to see that the edges of the bars are not blackened. The commutator should have an even dark-brown chocolate color. See that the brush holders (60) are sound and that the brush yoke (67) is firmly fastened. Examine the generator, especially the commutator surface, for loose dirt or engine oil. Loose dirt should be blown out and oil wiped away with a nonlinting cloth. If oil is found on the commutator, it is advisable to replace the brushes. The brush surface absorbs oil causing a high-voltage-contact drop which decreases the output of generator and increases its heating.

3. Care should be taken during the washing-down operations on the engine to see that none of the washing fluid enters the generator.

4. The generator is equipped with first-grade close-running ball bearings (134 and 135) lubricated at the factory for 1000 hours of operation. At each general overhaul of the generator, the ball bearings should be cleaned as follows: Wash the bearings thoroughly with carbon tetrachloride to remove all grease and oil; then wash bearings with clean, warm, lubricating oil. Grease at reassembly with Royco No. 5 (Navy Aero. Spec. M-372 Grade C) ball bearing grease as directed in Section VI. Be sure the bearings are kept clean until reassembly. Clean out the grease recess in the yoke and bearing support (67).

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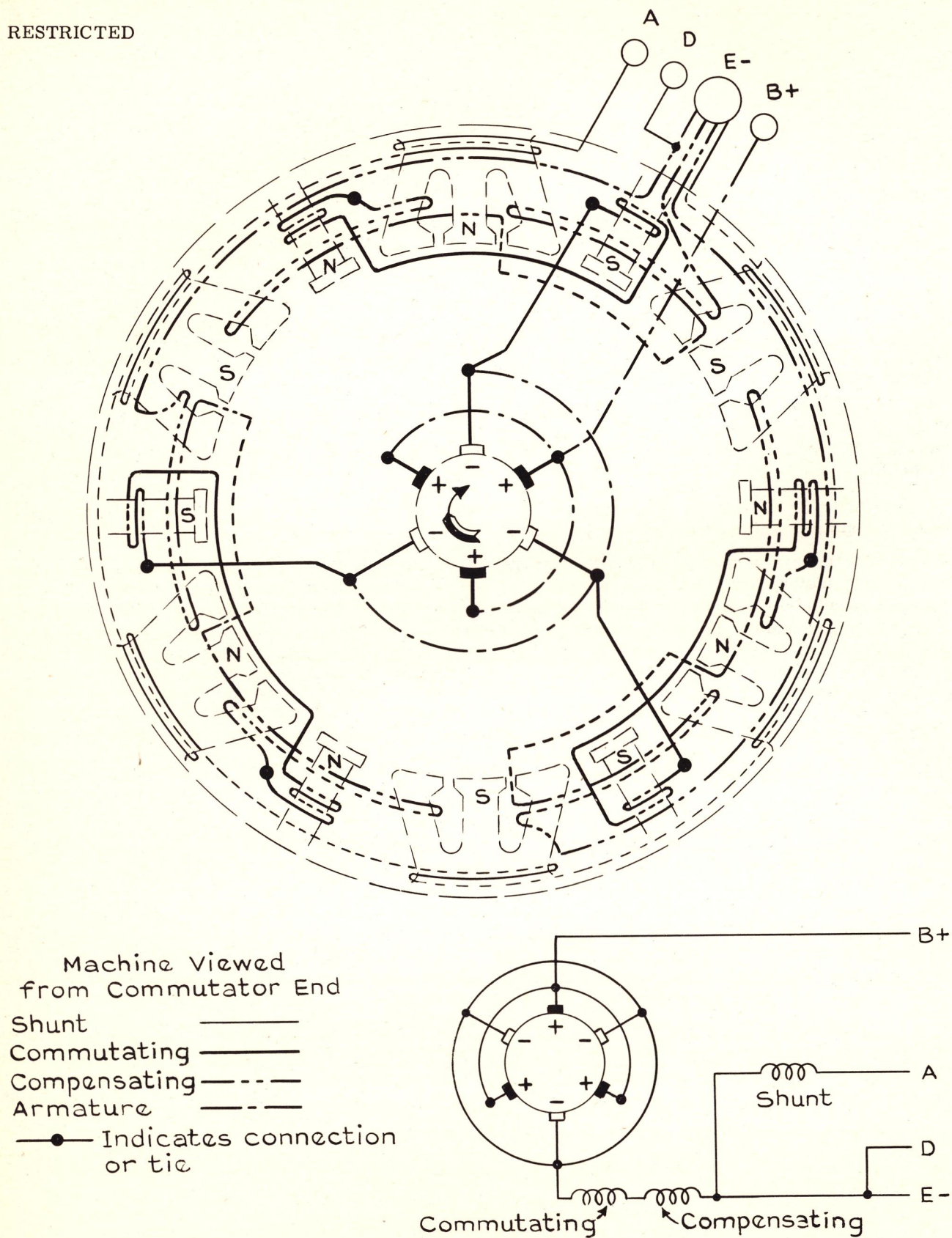


Fig. 5. Winding and Connection Diagram

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SECTION VI

DISASSEMBLY, OVERHAUL, REASSEMBLY, AND FINAL TEST

1. DISASSEMBLY (See Fig. 4)

a. Remove the air-blast cover (139) and the bushing (161) on the commutator end of the shaft. It is suggested that a wooden V-block be used to support the generator during disassembly, overhaul, and reassembly.

b. Disconnect the field leads from the brush terminals.

c. Remove the brush (42) from the brush holder by holding the brush spring with a small hook made of stiff wire. Care should be taken that the spring is not given a permanent set. Mark the brushes so that they can be reassembled in their original positions.

d. Remove the four screws (168) holding the ball bearing retaining plate (136).

e. Check the location paint marks indicating inductive neutral brush position. If the marks are illegible, replace them before disassembly. Remove the three screws (166) from end of end shield. Do not lose special lugs (165). Remove the six screws (171) which hold end shield (40) to field assembly (74). Gently tap the commutator end shield to free it from the field frame, and withdraw it from the armature (2). Use a rawhide mallet or similar tool for tapping. Do not use metal pries which will injure the machined surfaces of the castings.

f. Remove screws (171) from the mounting flange (70) which hold the mounting flange (71) to the field assembly. Gently tap the mounting flange to free it from the field frame, and carefully remove the mounting flange together with the armature from the field. Use a rawhide mallet or similar tool for tapping.

g. To remove the mounting flange from the armature, clamp the core section of the armature in a padded vise and gently tap the mounting flange. The grease seal will come off with the flange. It will probably not be necessary to replace the metal grease seal. If, however, it is necessary, remove the three screws (73) and pull out the grease seal (72).

2. OVERHAUL

a. Armature (See Fig. 7)

(1) Blow out the air passages with compressed air. Remove loose dirt, and wipe the armature clean. To remove drive-end ball bearing (134) use a standard commercial-type bearing puller. The commutator-end bearing (135) may be removed by the use of a suitable collar, made as shown in Fig. 9; and a standard commercial-type bearing puller. Slide the collar over the splined section of the inner shaft which projects through the outer shaft and pull off the ball bearing. The inner shaft will not be displaced nor the threaded-end section of the inner shaft damaged. Locate the drive screw of the bearing puller in the countersunk center hole of the collar.

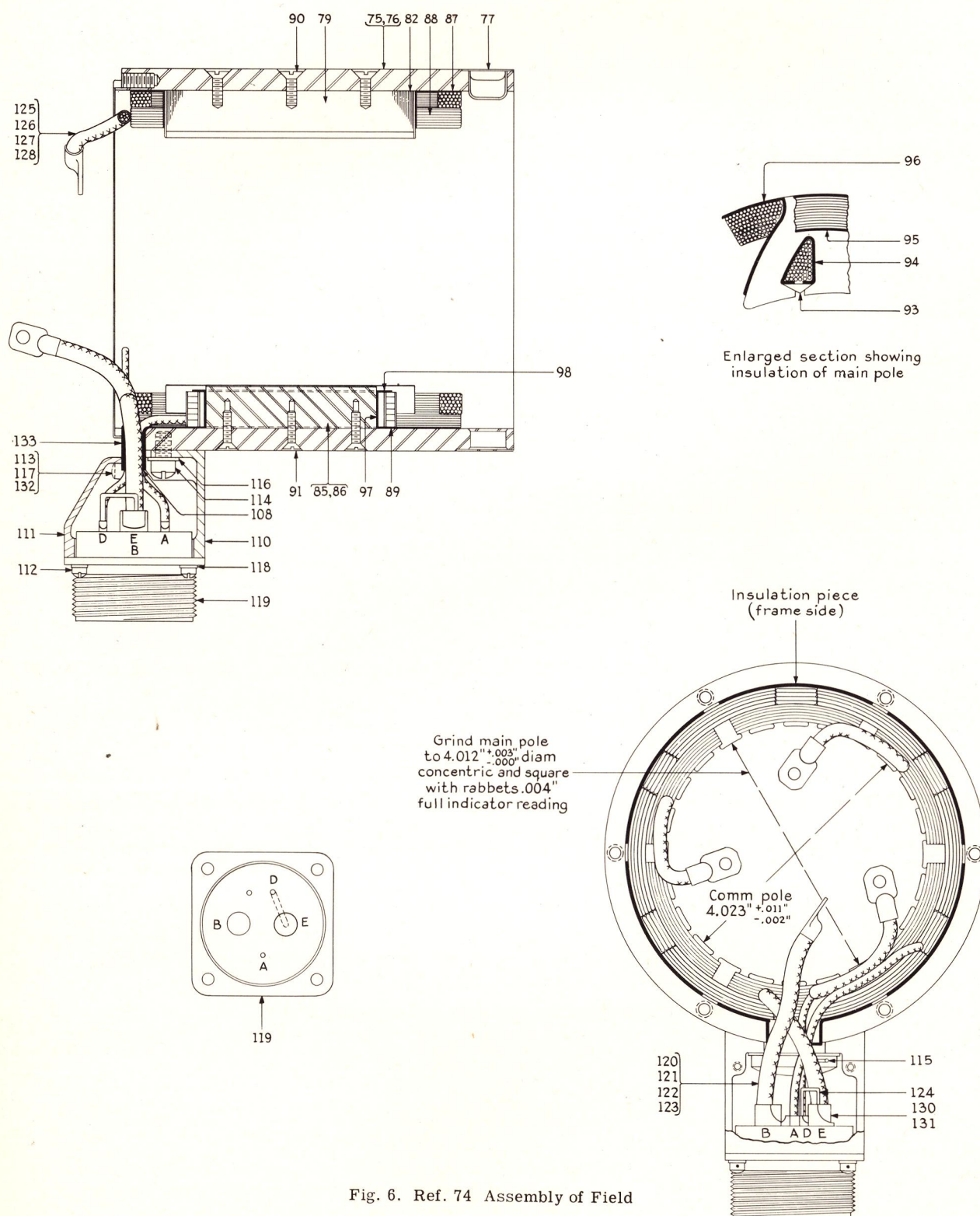
(2) If the commutator (10) is worn or grooved, set armature up in a lathe and take a minimum cut from the commutator surface. Finish by sanding with very fine sandpaper. Undercut mica 3/64-inch maximum and blow all copper and carbon dust from armature.

(3) Wash and clean the bearings as specified in Section V. Bearing retaining plate (136) is between commutator (10) and ball bearing (135) on commutator end.

(4) Give the armature windings (19) one coat of General Electric No. 1202 Glyptal or equivalent air-drying varnish.

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DISASSEMBLY, OVERHAUL, REASSEMBLY, AND FINAL TEST (CONT'D)

(5) Give the armature a high-potential test by connecting a 220-volt, 60-cycle, single-phase alternating-current "test light," for one minute between commutator and shaft. If single-phase alternating current is not available, any two leads of a 220-volt, three-phase supply may be used.

(6) If it is necessary to replace the inner shaft (22), follow the instructions given in paragraph 2-d of this section.

b. Field (See Fig. 6)

(1) Blow out all loose dirt with compressed air.

(2) Withdraw cover (111) from terminal box (110) and inspect the soldered connections. Blow out any dirt which may have accumulated. Check all soldered connections. If necessary, resolder with 99.6 per cent pure tin, using a flux of resin and alcohol. In emergency only, ordinary lead tin solder may be used. Good soldered connections must be maintained.

(3) Give windings and connections one coat of General Electric No. 1202 Glyptal or equivalent air-drying varnish. The replacement of field coils (87, 88, and 89) is not recommended in the field since it requires dipping and baking facilities. If, however, the field coils have to be replaced, then after replacement, the complete field assembly should be dipped in General Electric No. 1678 (Navy Spec. 52V13d, Grade CB) varnish and baked at 338 F for approximately twenty-five minutes. The field assembly should then be redipped and baked for three and one-half hours.

(4) Give the field windings a high-potential test by connecting a 220-volt, 60-cycle, single-phase alternating-current "test light" for one minute. If single-phase alternating current is not available, any two leads of a 220-volt, three-phase supply may be used.

c. Brush Rigging (See Fig. 8)

(1) Thoroughly clean and inspect the brush-holder bodies (60). Check the tension of the springs (65) to see that they are approximately equal.

(2) If brush-holder bodies (60) have to be replaced, it is recommended that a new complete brush rigging (41) be installed. In case of an emergency, a new brush-holder body can be installed as a temporary measure. For approximate setting, proceed as follows: Install a new body and adjust so the clearance between the bottom of the body and the commutator is 1/32-inch minimum and 3/32-inch maximum. In any case, new brush-holder bodies must be assembled on the yoke (67) so that brush contact on the commutator will be exactly 60 degrees apart to prevent sparking and poor commutation. Replace old brushes with a complete new set. (Refer to Section VI, 1-c, for removal of brushes). Replacement brushes should be seated - see Section VI, 3-g.

d. Replacement of Inner Shaft

This operation is not recommended in the field. The replacement of the complete armature assembly (2) is recommended. If, however, because of excessive wear or fatigue failure, the inner shaft (22) has to be removed and replaced, it should be done as follows:

(1) Remove ball bearing (134) at drive end of the armature. This is best done by means of a ball-bearing puller.

(2) If the inner shaft is intact, it can be pulled out by means of a puller designed to pull with a stud threaded into the 3/8 in.-16 tap in the end of the shaft and to push against the ball-bearing-seat shoulder on the outer shaft (4).

(3) If the shaft is broken, it must be pushed out from the commutator end. This is best done by setting up the armature in a hand arbor press resting it against the ball-bearing-seat shoulder on

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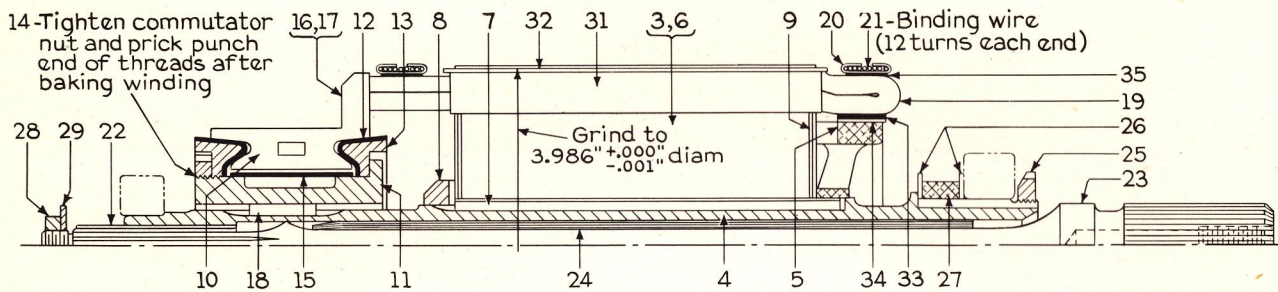


Fig. 7. Ref. 2 Assembly of Armature

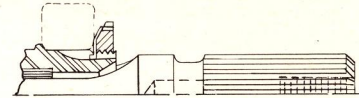


Fig. 7A

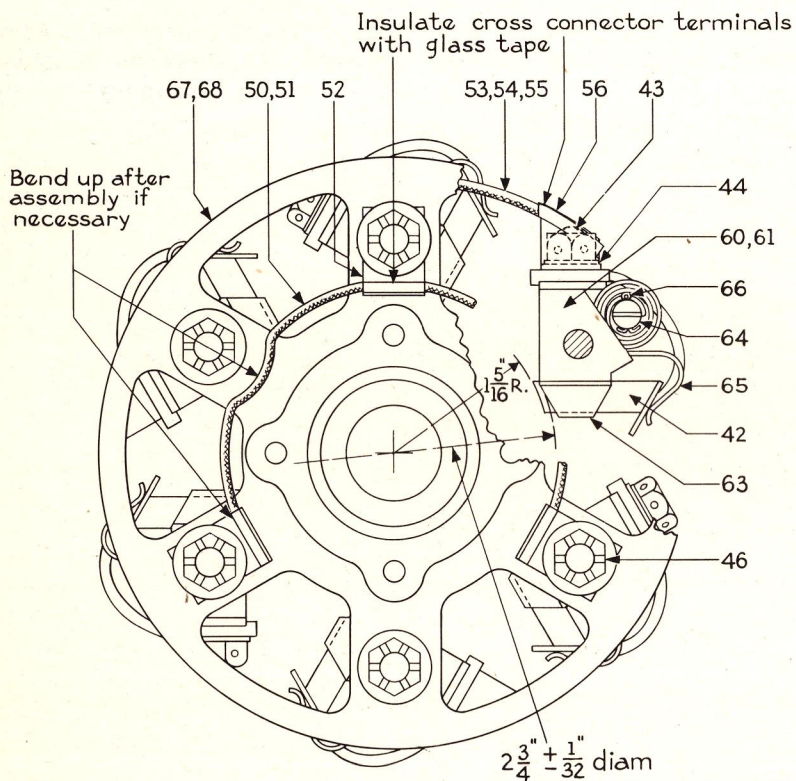
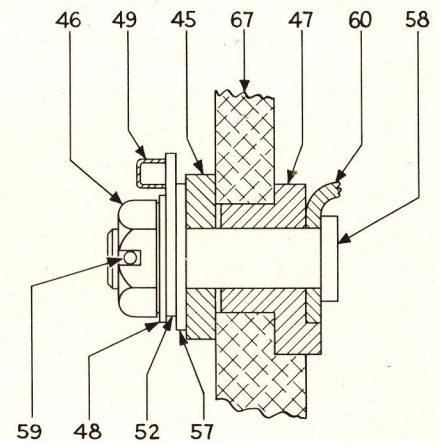


Fig. 8. Ref. 41 Brush Rigging



Method of mounting brush holder assembly

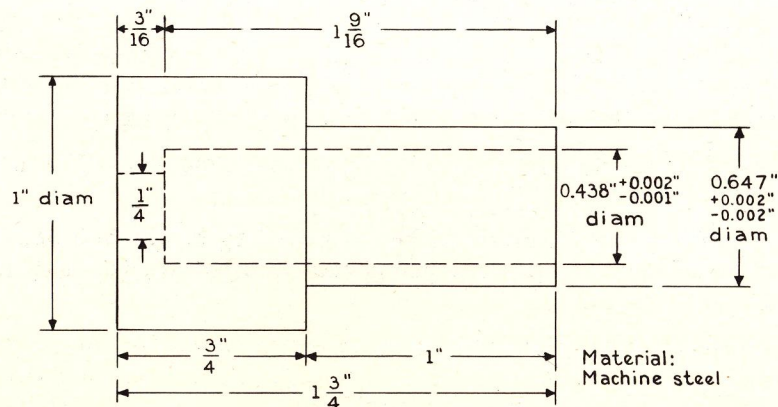


Fig. 9. Collar for Removal of Commutator-end Ball Bearing

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DISASSEMBLY, OVERHAUL, REASSEMBLY, AND FINAL TEST (CONT'D)

the mounting end. The shaft can be started by pressing directly on the commutator end. It can be pushed the rest of the way out by the use of one-half-inch diameter drill rod of various lengths.

(4) A great deal of care is required in inserting a new shaft, especially in aligning the multiple splines of the inner shaft with the grooves of the outer shaft. Try the fit of the splines and grooves by inserting the inner shaft from the commutator end of the armature. The shaft should fit snugly but should not bind. Lap the splines, if necessary, to obtain correct fit.

(5) Set up the armature in a lathe holding the armature on a center in the face plate and centering and clamping around the core section with a steady rest. Hold the inner shaft in a chuck set up in the tail stock of the lathe. Lay out and align the grooves of the outer shaft with the splines of the inner shaft. This must be done carefully and accurately. Press the shaft into place by moving the lathe tail stock.

3. REASSEMBLY (See Fig. 4, 7, 8)

a. The field assembly (74) is complete with terminal box and AN receptacle.

b. The armature (2) is reassembled as follows: Place the ball-bearing retaining plate (136) over the commutator end of the shaft and follow it with the ball bearing (135). The ball bearing should be heated to 225 F for 15 minutes. Force the bearing on the shaft by pressing it with a suitable collar held against the ball bearing inner race. Be careful not to allow dirt to get into the ball bearing. After heating, place the other ball bearing (134) on the drive end of the shaft and press it into place in the same manner. Add the ball-bearing lock washer (162) and the nut (25). When the ball bearings have to be removed, it is recommended that new bearings be reassembled onto the shaft.

c. Add one-half tablespoon of Royco No. 5 grease (Navy Aero. Spec. M-372 Grade C) to the bearing cavity of the mounting flange. Grease the drive-end and commutator-end ball bearings by filling the races one-half full of Royco No. 5 grease (Navy Aero. Spec. M-372 Grade C). Clamp the core (3) of the armature firmly in a padded vise. Place the mounting flange over the ball-bearing outer race and gently tap the flange into position.

d. Connect the brush rigging (41) to the field leads. The cross connector (50) on the outside of the brush rigging connects the negative brushes, which are connected to the field leads. The heavy B lead from the terminal box is connected to the center terminal of the inside cross connector (53). The inside cross connector connects the positive brushes. See Fig. 5.

e. Insert the armature (2) assembled with the mounting flange (70) carefully through the bore of the field (74) starting from the end opposite the connector assembly (119).

f. Tap the bearing support (69), in the brush-rigging assembly, with a rawhide mallet, to seat it firmly over the commutator-end ball bearing (135). It is recommended that the brush rigging be safety wired at this time.

g. Align the four holes in the ball-bearing retaining plate (136) with the four holes in the brush-rigging assembly. Install the four screws (163) and safety wire.

h. Slip the commutator-end shield (40) over the brush rigging and secure the commutator-end shield to the field assembly with six screws (171).

i. Line up the paint mark on the brush-rigging assembly with the paint mark on the commutator-end shield and hold the brush rigging in place with the three screws (166) and the three special clamping plugs (165). A special clamp (164) is provided to prevent lugs from turning.

j. Place bushing (161) over the commutator end of the shaft (23). The washer (29) and nut (28) holds the bushing tightly against the inner race of the ball bearing (135). As the outer race of the

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DISASSEMBLY, OVERHAUL, REASSEMBLY, AND FINAL TEST (CONT'D)

ball bearing is held firmly to the bearing support in the brush rigging by the ball bearing retaining plate, the end play of the armature is limited to the play in the close-running ball bearing. Turn the armature over by hand to see that it rotates freely and that there is no binding of the bearings or that the armature does not rub against the field assembly. Lock the nut (28) on the shaft with the cotter pin (170).

k. Replace brushes in their original positions. To insert the brushes, lift the loop on the brush springs (65) using a hook made of stiff wire. Care should be taken that the brush spring is not given a permanent set.

m. If new brushes are inserted, they should be given a proper fit with the commutator by means of the "seating" operation. Cut a piece of brush seater 6 in. by 1/2 in. by 1/4 in. (obtained from the American Emery Wheel Works, Providence, R. I., as "finishing Stone, Grade 180J," or from the Ideal Commutator Dresser Co., Sycamore, Ill., as "Carbon Brush Seater," or equivalent).

n. With the generator running in the proper direction of rotation, insert the stick of brush seater between the brush holders and press lightly against the commutator. Move the stick back and forth across the wearing surface of the commutator. If the stick is held in one place, the commutator will become grooved. In order that all the brushes may become seated, insert the stick between all the brush holders. During the "seating" operation, take care that live parts of the generator are not touched.

p. Shut down the generator and inspect the brush fit. The surface should show that at least 75 to 80 per cent of the brush surface has been fitted to the commutator. If the fit is less than 75 per cent, repeat the operation. Do not "seat" the brushes any more than necessary. After the brushes have been properly fitted, blow out the generator with dry compressed air. Blow the dust away from the machine rather than into it.

q. The generator is assembled for forced ventilation. After "FINAL TEST," place the air-blast cover (139) over the commutator end of the generator and clamp in place.

4. FINAL TEST

a. The generator is now assembled and is ready for the bench test. If no bench test equipment is available, install the generator on the power plant to facilitate adjustment.

b. Set the brush position on "inductive neutral" (which is the no-load magnetic neutral). This is done with the generator at rest. Apply approximately 6-24 volts direct current between terminal E and A, Fig. 5. Read the voltage across two adjacent brush-holder assemblies by means of a millivoltmeter. The needle of the meter will "kick" each time the circuit is opened or closed. Move the entire brush-rigging assembly (41) until no "kick" of the needle is obtained. This position is "inductive neutral."

c. To obtain the best position for sparkless commutation, move the brush-rigging assembly 1/16 inch ahead of "inductive neutral" in the direction of rotation. Measure this on the inside rim of the end shield. Lock the brush-rigging assembly tightly.

d. See that the brushes move freely in their brush holders and that all connections are tight.

e. Turn the armature over by hand to see that it rotates freely.

f. To check for output voltage and polarity, drive the generator at 2500 rpm. If the generator does not build up, apply voltage to the fields as in paragraph 4-b, except that positive polarity is connected to A and the negative polarity is connected to E, Fig. 5. The generator should then build up to at least 15 volts.

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DISASSEMBLY, OVERHAUL, REASSEMBLY, AND FINAL TEST (CONT'D)

g. Preparatory to a high-potential test, drive the generator at 200 amperes, 28.5 volts, 2500 rpm for one hour.

h. To give a high-potential test, connect a 220-volt, 60-cycle, single-phase, alternating-current "test light" for one minute between the shaft or frame of the generator and the commutator. If single-phase alternating current is not available, any two leads of a 220-volt, three-phase supply may be used.

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PARTS CATALOG
for
AIR CORPS TYPE P-1 GENERATOR
(For Aircraft)
MODEL 2CM70B1

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MAJOR ITEM		Generator, Type P-1 (Round Frame)									
ASSEMBLY UNIT		Generator, Model 2CM70B1									
Fig.	Ref.	PART NUMBER	SIZE	1	2	3	4	5	PART NAME	No. REQ'D.	
2		6628154	T	Outline							
4	1	6628258	T	Assembly						1	
4,7	2	6628114Gr.1	M	Armature assembly						1	
7	3	6628115Gr.1	M	Core, armature						1	
7	4	6628098Pt.1	M	Shaft, outer						1	
7	5	6628278Pt.1	M	Head, armature						1	
7	6	6627361Pt.1	K	Punching, armature						211	
7	7	6627190	K	Key, armature						1	
7	8	6622668	K	Collar, armature						1	
7	9	6627361Pt.2	K	Punching, end, armature						9	
7	10	6627231Gr.1	K	Commutator						1	
7	11	6627413	K	Shell, commutator (completely machined)						1	
--	--	6627492		Shell (partially machined)							
7	12	6621190	V	Cone, insulation						2	
7	13	6621191	V	Cap, commutator						2	
7	14	6621192	K	Nut, commutator						1	
7	15	6627167	K	Barrel, insulation						1	
7	16	6627487	K	Segment, insulation						55	
7	17	6627482	K	Segment, commutator (bar gage 6627481)						55	
7	18	6627197	K	Key, commutator						1	
7	19	3227706-A	Spec.	Coil (set of 55)						1	
7	20	2320940	V	Clip, binding						6	
7	21	6628114Pt.7	M	Wire, binding						1	
7	22	6628097Gr.1	M	Shaft, inner						1	
7	23	6628097Pt.1	M	Shaft						1	
				1	2	3	4	5			

MAJOR ITEM		Generator, Type P-1 (Round Frame)									
ASSEMBLY UNIT		Generator, Model 2CM70B1									
Fig.	Ref.	PART NUMBER	SIZE	1	2	3	4	5	PART NAME	No. REQ'D.	
7	24	6628097Pt.2	M						Cloth, asbestos	1	
7	25	6621205	V						Nut, driven-end	1	
7	26	Δ6627456	K						Washer	2	
7	27	Δ6627417	K						Spacer	1	
7	28	AN320-5							Nut, shear, commutator-end	1	
7	29	6622761	K						Washer	1	
--	30	6627193Gr.1	K						Insulation, armature	1	
7	31	6627192	K						Insulation, slot	55	
7	32	6627191	K						Stick, top	55	
7	33	6627193Pt.3	K						Insulation, head (glass tape)	--	
7	34	6627193Pt.4	K						Insulation, head (mica)	--	
7	35	6627193Pt.5	K						Insulation under binding wire	2	
7	36	6627193Pt.6	K						Insulation between coils (driven end)	1	
--	37	6627193Pt.7	K						Insulation between leads (commutator end)	1	
--	38	6627193Pt.9	K						Insulation between leads (commutator end)	--	
--	39	6627193Pt.8	K						String, glass, for bottom of slot	55	
4	40	6628091Pt.1	P						Shield, end (commutator end)	1	
7,8	41	6628222Gr.1	M						Rigging, brush	1	
8	42	6627294	K						Brush assembly (twin)	6	
8	43	AN73-3							Screw	6	
8	44	6627336	K						Washer	6	
8	45	6627327	K						Washer, insulation	6	
8	46	AN320-4							Nut, shear	6	
8	47	6627326	K						Bushing	6	
8	48	6627597	K						Washer	3	
8	49	6627613	K						Connector, cross (outside)	1	
				1	2	3	4	5			

Δ The Model 2CM70B1 generator has been furnished with two designs of an outer armature shaft. One of these designs is as shown in Fig. 7 and uses two washers Ref. 26 and a spacer Ref. 27. The other design is as shown in Fig. 7A and does not make use of washers or a spacer.

MAJOR ITEM		Generator, Type P-1 (Round Frame)								
ASSEMBLY UNIT		Generator, Model 2CM70B1								
Fig.	Ref.	PART NUMBER	SIZE	1	2	3	4	5	PART NAME	No. REQ'D.
8	50		ND						Wire, copper (.085-in. x .115-in. x 6 3/4 in. long)	1
8	51		ND						Tubing, varnished spun glass	--
8	52	6627612	K						Terminal	3
8	53	6627521	K						Connector, cross (inside)	1
8	54		ND						Wire, copper (.085-in. x .115-in. x 10 7/8 in. long)	1
8	55		ND						Tubing, varnished spun glass	--
8	56	6627519	K						Terminal	3
8	57	6627338	K						Washer	6
8	58	6627306	K						Screw	6
8	59	AN380-2-2							Pin, cotter	6
8	60	6628210Gr.1	M						Holder assembly, brush	6
8	61	6628201Gr.1	M						Body assembly, brush-holder	1
8	62	6628202	M						Body, brush-holder	1
8	63	6627303	K						Strip, retaining	1
8	64	6627305	K						Stud	1
8	65	6627321	K						Spring	12
8	66	AN380C-2-2							Pin, cotter	12
8	67	6628087Gr.1	M						Support, yoke and bearing	1
8	68	6628087Pt.1	M						Yoke	1
4	69	6627525	K						Insert, bearing	1
3,4	70	6628101Gr.1	P						Flange assembly, mounting	1
4	71	6628110Pt.1	P						Flange, mounting	1
4	72	6627354	K						Seal, oil	1
4	73	AN510-6-6							Screw	3
4,6	74	6628116Gr.1	P						Field assembly	1
				1	2	3	4	5		

MAJOR ITEM		Generator, Type P-1 (Round Frame)								
ASSEMBLY UNIT		Generator, Model 2CM70B1								
Fig.	Ref.	PART NUMBER	SIZE	1	2	3	4	5	PART NAME	No. REQ'D.
6	75	6628088Gr.1	P				Frame			1
6	76	6628100Pt.1	M				Frame, magnet (rough)			1
6	77	6628221	M				Screen, cover			1
--	78	6628088Pt.3	P				Stud, drive			2
6	79	6628090Gr.2	M				Pole, main			6
--	80	6628090Pt.3	M				Rivet			2
--	81	6628090Pt.4	M				Rivet			2
6	82	6628055Pt.2	M				Punching			207
--	83	6628393Pt.1	M				Punching, end			2
--	84	6628393Pt.2	M				Punching, insulation			2
6	85	6627320	K				Pole, commutating			6
6	86	6627319	K				Pole, commutating (forging)			1
6	87	3208238-1	K				Winding, field (main) shunt wound			1
6	88	3208239-1	K				Winding, field (compensating)			1
6	89	3208240-1	K				Winding, field (commutating)			1
6	90	AN505-8-8					Screw, main-pole			18
6	91	AN510-6-8					Screw, commutating-pole			18
--	92	6627424Gr.1	K				Insulation, field			1
6	93	6627194	K				Stick, top			24
6	94	6627522	K				Tube, slot			12
6	95	6627419	K				Insulation, coil-end			12
6	96	6627423	K				Insulation, shunt-coil			12
6	97	6627421	K				Strip, commutating-pole			6
6	98	6627393	K				Insulation, commutating-pole			12
--	99	6627560	K				Piece, insulation			6
--	100	6627561	K				Piece, insulation			6
				1	2	3	4	5		

MAJOR ITEM		Generator, Type P-1 (Round Frame)								
ASSEMBLY UNIT		Generator, Model 2CM70B1								
Fig.	Ref.	PART NUMBER	SIZE	1	2	3	4	5	PART NAME	No. REQ'D.
--	101	6627424Pt.10	K						Sleeving	1
--	102	6627424Pt.11	K						Sleeving	1
--	103	6627424Pt.12	K						Sleeving	3
--	104	6627424Pt.13	K						Sleeving	6
--	105	6627424Pt.14	K						Sleeving	3
--	106	6627424Pt.15	K						Sleeving	3
--	107	6627424Pt.16	K						Sleeving	5
6	108	6627599	K						Insulation, lead-hole	1
--	109	6627424Pt.18	K						Sleeving	1
6	110	6628265Pt.1	M						Box, terminal	1
6	111	6628265Pt.2	M						Cover, terminal-box	1
6	112	AC503-8-6							Screw	4
6	113	AN960-8							Washer, plain	2
6	114	AN502-416-8							Screw	2
6	115	Army Spec, 48-37TY-1							Wire, safety (0.032-in. diam)	--
6	116	AN960-416							Washer, plain	2
6	117	AC503-8-8							Screw	2
6	118	AN936A8							Washer, lock for No. 8 screw (Shakeproof No. 1208)	4
6	119	AN3102-32-1P							Connector	1
6	120	6627446	K						Lead	1
6	121		ND						Cable (copper, 4 in. long)	2
6	122		ND						Tubing (varnished spun glass, 3 in. long)	1
6	123	3797255	K						Terminal, tube	1
6	124	6628116Pt.22	P						Jumper	--
6	125	6627504	K						Lead	3
				1	2	3	4	5		

MAJOR ITEM		Generator, Type P-1 (Round Frame)								
ASSEMBLY UNIT		Generator, Model 2CM70B1								
Fig.	Ref.	PART NUMBER	SIZE	1	2	3	4	5	PART NAME	No. REQ'D.
6	126		ND						Cable	1
6	127		ND						Tubing (varnished spun glass, 2 in. long)	1
6	128	3797254	K						Terminal, tube	1
--	129	328163	V			Clip				6
6	130	340281	V			Clip				1
6	131	375355	V			Clip				1
6	132	6627394	K			Clamp				2
6	133	6627582	K			Shim				1
4	134	243X66	ND			Bearing, ball, drive-end (SKF-6205-Z, specially selected for 0.0004-in. max runout on inner race)				1
4	135	243X65	ND			Bearing, ball, commutator-end (SKF-6203-Z, specially selected for 0.0004-in. max runout on inner race)				1
4	136	6627189	K			Plate, retaining				1
4	137	6627187	K			Plate				1
4	138		ND			Pad (1/8 in. thick, 1/2 in. diam)				4
4	139	6628196Gr.1	P			Cover, air-blast				1
--	140	6628195Pt.1	P			Cap, cooling (upper)				1
--	141	6628307	P			Shell for upper cooling cap				1
4	142	6627299	K			Clamp, upper				2
--	143	6627298	K			Strap				1
--	144	6627198	K			Clamp				1
--	145		ND			Boss, welding (3/8 in. x 1/2 in. x 1/8 in.)				1
4	146	AN430-AD44	ND			Rivet				12
--	147	6628195Pt.2	P			Cap, cooling (lower)				1
--	148	6628307	P			Shell for lower cooling cap				1
4	149	6627302	K			Clamp, lower				2
				1	2	3	4	5		

MAJOR ITEM		Generator, Type P-1 (Round Frame)								
ASSEMBLY UNIT		Generator, Model 2CM70B1								
Fig.	Ref.	PART NUMBER	SIZE	1	2	3	4	5	PART NAME	No. REQ'D.
--	150	6627298	K						Strap	1
--	151	6627198	K						Clamp	1
4	152	6627295	K						Inlet, air	1
4	153	6627245	K						Screw, clamping	3
--	154	6627457	K						Strip	2
4	155	6628121Gr.1	M						Ring, clamp	1
--	156	6627198	K						Clamp	2
--	157	6628121Pt.3	M						Strap	1
--	158	6628121Pt.4	M						Boss, welding	1
--	159	6627548	K						Strip, inner	1
--	160	6627296	K						Strip, outer	1
4	161	6627209	K						Bushing, commutator-end	1
4	162	46X798	ND						Washer, lock, for ball bearing (SKF W-05)	1
4	163	AN73-5	ND						Screw for (B+) lead	1
4	164	6627584	K						Clamp	3
4	165	6627200	K						Lugs	3
4	166	6627585	K						Screw for brush-rigging	3
4	167	6627336							Washer	3
4	168	AC503-8-14	ND						Screw for retaining plate	4
4	169	AN960-8	ND						Washer	4
4	170	AN380C-2-2	ND						Pin, cotter	1
4	171	6627601	K						Screw for end shield and mounting flange	18
4	172	6627394	K						Clamp	6
4	173	Army Spec. 48-37-Ty 1	ND						Wire, safety	--
4	174								Nameplate (NP 94402)	1
4	175	AC530-4-4	ND						Screw for nameplate (Shakeproof self-tapping 4-40, 1/4 in. r.h.)	4
				1	2	3	4	5		

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ALPHABETICAL PARTS LIST

Name	Part Number	Assembly List Page No.	Qty. Req.
Armature assembly	6628114Gr.1	1	1
Barrel, insulation	6627167	1	1
Bearing, ball, commutator-end	243X65	6	1
Bearing, ball, drive-end	243X66	6	1
Body assembly, brush-holder	6628201Gr.1	3	6
Body, brush-holder	6628202	3	1
Boss, welding	6628121Pt.4	1	1
Box, terminal	6628265Pt.1	5	1
Brush assembly (twins)	6627294	2	6
Bushing	6627209	7	1
Bushing	6627326	2	6
Cap, commutator	6621191	1	2
Cap, cooling (lower)	6628195Pt.2	6	1
Cap, cooling (upper)	6628195Pt.1	6	1
Clamp	6627198	6,7	
Clamp	6627394	6,7	8
Clamp	6627584	7	3
Clamp, lower	6627302	6	2
Clamp, upper	6627299	6	2
Clip	328163	6	6
Clip	340281	6	1
Clip	375355	6	1
Clip, binding	2320940	1	6
Cloth, asbestos	6628097Pt.2	2	1
Coil (set of 55)	3227706-A	1	1
Collar, armature	6622668	1	1
Commutator	6627231Gr.1	1	1
Cone, insulation	6621190	1	2
Connector, cross	6627521	3	1
Connector, cross	6627613	2	1
Core, armature	6628115Gr.1	1	1
Cover, air blast	6628196Gr.1	6	1
Cover, terminal-box	6628265Pt.2	5	1
Field assembly	6628116Gr.1	3	1
Flange assembly, mounting	6628101Gr.1	3	1
Flange, mounting	6628110Pt.1	3	1
Frame	6628088Gr.1	4	1
Frame, magnet (rough)	6628100Pt.1	4	1
Head, armature	6628278Pt.1	1	1
Holder assembly (brush)	6628210Gr.1	3	6
Inlet, air	6627295	7	1
Insert, bearing	6627525	3	1
Insulation, armature	6627193Gr.1	2	1
Insulation between coils (drive-end)	6627193Pt.6	2	1
Insulation between leads	6627193Pt.7	2	1
Insulation between leads	6627193Pt.9	2	
Insulation, coil-end	6627419	4	12
Insulation, commutating pole	6627393	4	12
Insulation, field	6627424Gr.1	4	1
Insulation, head (glass type)	6627193Pt.3	2	--

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ALPHABETICAL PARTS LIST (CONT'D)

Name	Part Number	Assembly List Page No.	Qty. Req.
Insulation, head (mica)	6627193Pt.4	2	--
Insulation, lead-hole	6627599	5	1
Insulation, slot	6627192	2	55
Insulation, shunt-coil	6627423	4	12
Insulation under binding wire	6627193Pt.5	2	2
Jumper	6628116Pt.22	5	
Key, armature	6627190	1	1
Key, commutator	6627197	1	1
Lead	6627446	5	1
Lead	6627504	1	3
Lugs	6627200	7	3
Nameplate	NP-94402	7	1
Nut, commutator	6621192	1	1
Nut, driven-end	6621205	2	1
Piece, insulation	6627560	4	6
Piece, insulation	6627561	4	6
Plate	6627187	6	1
Plate, retaining	6627189	6	1
Pole, commutating (forging)	6627319	4	1
Pole, commutating	6627320	4	6
Pole, main	6628090Gr.2	4	6
Punching	6628055Pt.2	4	207
Punching, armature	6627361Pt.1	1	211
Punching, end, armature	6627361Pt.2	1	9
Punching, end	6628393Pt.1	4	2
Punching, insulation	6628393Pt.2	4	2
Rigging, brush	6628222Gr.1	2	1
Ring, clamp	6628121Gr.1	7	1
Rivet	6628090Pt.3	4	4
Screen, cover	6628221	4	1
Screw	6627306	3	6
Screw	6627585	7	3
Screw	6627601	7	18
Screw, clamping	6627245	7	3
Screw, self-tapping	-----	7	4
Seal, coil	6627354	3	1
Segment, commutator	6627482	1	55
Segment, insulation	6627487	1	55
Shaft	6628097Pt.1	1	1
Shaft, inner	6628097Gr.1	1	1
Shaft, outer	6628098Pt.1	1	1
Shell, commutator (completely machined)	6627413	1	1
Shell (partially machined)	6627492	1	
Shell for cooling cap	6628307	6	2
Shield, end (commutator end)	6628091Pt.1	2	1
Shim	6627582	6	1
Sleeving	6627424Pt.10	5	1
Sleeving	6627424Pt.11	5	1
Sleeving	6627424Pt.12	5	3
Sleeving	6627424Pt.13	5	6

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ALPHABETICAL PARTS LIST (CONT'D)

Name	Part Number	Assembly List Page No.	Qty. Req.
Sleeving	6627424Pt.14	5	3
Sleeving	6627424Pt.15	5	3
Sleeving	6627424Pt.16	5	5
Sleeving	6627424Pt.18	5	1
Spacer	6627417	2	1
Spring	6627321	3	12
Stick, top	6627191	2	55
Stick, top	6627194	4	24
Strap	6627298	6,7	2
Strap	6628121Pt.3	7	1
String, glass	6627193Pt.8	2	55
Strip	6627457	7	2
Strip, commutating pole	6627421	4	6
Strip, inner	6627548	7	1
Strip, outer	6627296	1	1
Strip, retaining	6627303	3	1
Stud	6627305	3	1
Stud, drive	6628088Pt.3	4	2
Support, yoke and bearing	6628087Gr.1	3	1
Terminal	6627519	3	3
Terminal	6627612	3	3
Terminal, tube	3797254	6	1
Terminal, tube	3797255	5	1
Tube, slot	6627522	4	12
Washer	6622761	2	1
Washer	6627336	2,7	9
Washer	6627338	3	6
Washer	6627456	2	2
Washer	6627597	2	3
Washer, insulation	6627327	2	6
Washer, lock (SKF -W -05)	46X798	7	1
Winding, field (commutating)	3208240-1	4	1
Winding, field (compensating)	3207239-1	4	1
Winding, field (main) shunt wound	3208238-1	4	1
Wire, binding	6628114Pt.7	1	1
Yoke	6628087Pt.1	3	1

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NUMERICAL PARTS LIST

Part Number	Alphabetical List Page No.	Part Number	Alphabetical List Page No.
NP-94402	2	6627321	3
328163	1	6627326	1
340281	1	6627327	3
375355	1	6627336	3
2320940	1	6627338	3
3208238-1	3	6627354	2
3208239-1	3	6627361Pt.1	2
3208240-1	3	6627361Pt.2	2
3227706-A	1	6627366	3
3797254	3	6627393	1
3797255	3	6627394	1
6621190	1	6627413	2
6621191	1	6627417	3
6621192	2	6627419	1
6621205	2	6627421	3
6622668	1	6627423	2
6622761	2	6627424Gr.1	1
6627167	1	6627424Pt.10	2
6627187	2	6627424Pt.11	2
6627189	2	6627424Pt.12	2
6627190	2	6627424Pt.13	2
6627191	3	6627424Pt.14	3
6627192	2	6627424Pt.15	3
6627192Gr.1	1	6627424Pt.16	3
6627193Pt.3	1	6627424Pt.18	3
6627193Pt.4	2	6627446	2
6627193Pt.5	2	6627456	3
6627193Pt.6	1	6627457	3
6627193Pt.7	1	6627482	2
6627193Pt.8	3	6627487	2
6627193Pt.9	1	6627492	2
6627194	3	6627504	2
6627197	2	6627519	3
6627198	1	6627521	1
6627200	2	6627522	3
6627209	1	6627525	1
6627231Gr.1	1	6627548	3
6627245	2	6627560	2
6627294	1	6627561	2
6627295	1	6627582	2
6627296	3	6627584	1
6627298	3	6627585	2
6627299	1	6627597	3
6627302	1	6627599	2
6627303	3	6627601	2
6627305	3	6627612	3
6627306	2	6627613	1
6627319	2	6628055Pt.2	2
6627320	2	6628087Gr.1	3
		6628087Pt.1	3

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NUMERICAL PARTS LIST (CONT'D)

Part Number	Alphabetical List Page No.	Part Number	Alphabetical List Page No.
6628088Gr.1	1	6628121Pt.3	3
6628088Pt.3	3	6628121Pt.4	1
6628090Gr.2	2	6628195Pt.1	1
6628090Pt.3	2	6628195Pt.2	1
6628090Pt.4	2	6628196Gr.1	1
6628091Pt.1	2	6628201Gr.1	1
6628097Gr.1	2	6628202	1
6628097Pt.1	2	6628210Gr.1	1
6628097Pt.2	1	6628221	2
6628098Pt.1	2	6628222Gr.1	2
6628100Pt.1	1	6628265Pt.1	1
6628101Gr.1	1	6628265Pt.2	1
6628110Pt.1	1	6628278Pt.1	1
6628114Gr.1	1	6628307	2
6628114Pt.7	3	6628393Pt.1	2
6628115Gr.1	1	6628393Pt.2	2
6628116Gr.1	1	46X798	3
6628116Pt.22	2	243X65	1
6628121Gr.1	2	243X66	1

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